

Appl. No. 10/658,828
Docket No.: H1799-00210
Reply to Office Action of March 3, 2004

REMARKS/ARGUMENTS

As a result of this Amendment, claims 1, 3-4, 6, 9-15, 17-21, 24-25 and 26, are under active consideration in the subject patent application. A one (1) month extension of time to file the Response is filed concurrently with this Amendment requesting the extension of time for response from June 9, 2004, to July 9, 2004. The Commissioner is authorized to charge the fee required in connection with the requested extension, namely \$110.00, and the fee for one (1) additional independent claim in excess of three (3) independent claims, namely \$86.00, to Deposit Account No. 04-1679. In the Official Action, the Examiner has:

- (1) rejected claim 1 under 35 U.S.C. § 102(b) as allegedly being anticipated by Chrysler et al., "Enhanced Thermosyphon Cooling Scheme"; IBM Technical disclosure Bulletin, Vol. 37, No. 10, October 1994, pp. 11-12;
- (2) rejected claims 1, 2, 9, 12, and 17 under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 4,393,663, issued to Grunes et al.;
- (3) rejected claims 17-20 under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,761,037, issued to Anderson et al.;
- (4) rejected claims 3 and 4 under 35 U.S.C. § 103(a) in view of a proposed combination of U.S. Patent No. 4,393,663, issued to Grunes et al., and Japanese Patent No. JP61-250491, issued to Otani et al.;
- (5) rejected claims 5,6, and 24 under 35 U.S.C. § 103(a) in view of U.S. Patent No. 4,393,663, issued to Grunes et al.;
- (6) rejected claim 21 under 35 U.S.C. § 103(a) in view of U.S. Patent No. 5,761,037, issued to Anderson et al.;

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(7) rejected claim 25 under 35 U.S.C. § 103(a) in view of a proposed combination of U.S. Patent No. 5,761,037, issued to Anderson et al., and Japanese Patent No. JP61-250491, issued to Otani et al.;

(8) rejected claims 10, 11, 13, and 14 under 35 U.S.C. § 103(a) in view of a proposed combination of U.S. Patent No. 4,393,663, issued to Grunes et al., and U.S. Patent No. 5,822,187, issued to Garner et al.; and

(9) rejected claim 15 under 35 U.S.C. § 103(a) in view of a proposed combination of U.S. Patent No. 4,393,663, issued to Grunes et al., and U.S. Patent No. 5,822,187, issued to Garner et al., and Japanese Patent No. JP61-250491, issued to Otani et al.

With regard to Item 1, Applicant has amended claims 1, 6, 9 – 10, 12, 17 – 18, 20 – 21, and 24 – 25 so as to better distinguish the present invention over each of the prior art references relied upon by the Examiner in the Official Action. Claims 2, 5, 7-8, 16, and 22-23 have been cancelled from the application. New claim 26 has been added to define further patentable aspects of the present invention. Support for the changes to the foregoing claims can be found throughout the specification and drawings, particularly, at pages 10-12 of the specification and in at least Figs. 4 and 5. No new matter has been introduced into the application as a result of these changes to the claims.

Applicant traverses the Examiner's rejection of claim 1 as being anticipated by the IBM Technical Bulletin published by International Business Machines Corporation, and entitled *Enhanced Thermosyphon Cooling Scheme*

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("the IBM reference"). Reconsideration and withdrawal of the rejection are requested for the following reasons. Applicant provides a thermal energy management system that includes a planar heat pipe operatively engaged with at least one heat generating component where the planar heat pipe is sized and shaped so as to spread thermal energy over an area larger than the area of the at least one heat generating component. A thermal bus is operatively engaged with the planar heat pipe so as to transport thermal energy from the planar heat pipe to a heat sink. Significantly, Applicant's thermal bus includes a tubular evaporator portion of a loop-thermosyphon. None of the foregoing structure is taught or even vaguely suggested by the IBM reference.

More particularly, the IBM reference discloses the use of thermoelectric modules to enhance the performance of a loop thermosyphon. The publication suggests that the inclusion of a thermoelectric module between the heat generating components and an evaporator of a loop thermosyphon will enhance thermosyphon performance by allowing the electronic module to operate at a lower temperature, while at the same time, elevating the temperature of the evaporator to provide enhanced boiling. There is simply no teaching or suggestion of the use of a planar heat pipe that operatively engages at least one heat generating component where the planar heat pipe is sized and shaped so as to spread thermal energy over an area larger than the area of the at least one heat generating component or that is engaged with any portion of the loop

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thermosyphon. Moreover, the IBM reference is devoid of any teaching or suggestion of a tubular evaporator portion of a loop-thermosyphon.

Anticipation under 35 U.S.C. §102 requires that each and every element of the invention defined in the claim be met in a single prior art reference. Those elements must either be inherent or disclosed expressly, and must be arranged as described in the claim. See, Diversitech Corporation v. Century Steps, Inc., 850 F. 2d 675, 7 U.S.P.Q. 2d 1315 (Fed. Circuit 1988), Constant v. Advanced Micro-Devices, Inc., 848 F. 2d 1560, 7 U.S.P.Q. 2d 1057 (Fed. Circuit 1988), and Richardson v. Suzuki Motor Company, 868 F. 2d 1226, 9 U.S.P.Q. 2d 913 (Fed. Circuit 1989). The IBM reference fails to meet this requirement since Applicants' invention, as claimed, is not expressly or inherently disclosed within the four corners of the reference. In particular, the IBM reference fails to teach or suggest the use of a planar heat pipe of any kind or, a tubular evaporator portion of a loop-thermosyphon. Accordingly, it cannot be said that the IBM reference anticipates the subject matter of claim 1 or, for that matter, any of the currently pending claims, under 35 U.S.C. §102.

Reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §102 are requested.

With regard to Item 2, Applicant traverses the Examiner's rejection of claims 1, 9, 12, and 17 as being anticipated by U.S. Patent No. 4,393,663, issued to Grunes et al. ("the Grunes reference"). Reconsideration and withdrawal of the rejections are requested for the following reasons. The Examiner has alleged

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that Grunes discloses a thermal energy management system comprising a heat spreading device which is operatively engaged with at least one heat generating component and a thermal bus that is operatively engaged with a heat spreading device so as to transfer thermal energy. The Examiner states that Grunes discloses a heat spreading device comprising a heat pipe in Figs. 2 and 3 of the application. This is an incorrect characterization of the structure taught by Grunes.

In fact, Grunes discloses a two phase thermosyphon heater that transfers heat from a heat source to a heat sink using a vaporizable liquid that is heated in an evaporator so that some of the liquid vaporizes to propel the remaining heated liquid to a condenser. At column 1, lines 33 – 40,

“...It is popularly believed that heat transfer in a heat pipe of this type is most efficient when heat is transferred by way of a vapor-to-liquid phase change heat transfer. In the present invention it has been discovered that heat transfer performance as high as, or better than, the apparatus of the prior art can be achieved without using the vapor-to-liquid heat transfer mechanism as the only heat transfer mechanism...”[emphasis added]

Thus, Grunes clearly suggests that the use of a heat spreader that employs only a vapor-to-liquid heat transfer mechanism (such as Applicant's planar heat pipe heat spreader) is inferior and outside the scope of his disclosure! This point is born out by the fact that Grunes only discusses heat pipes in his background of the invention. In fact, a word processor based word-search of the Grunes reference's detailed description of the preferred

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embodiment and claims yields no mention of the word "heat pipe" anywhere. As a consequence, the Examiner's reliance upon Figs. 2 and 3 as presenting a heat pipe in combination of the other structures is simply not supported within the four corners of the Grunes reference.

Accordingly, claims 1, 9, 12, and 17 are allowable over both the IBM reference and the Grunes reference whether taken alone or in any valid combination.

With regard to Item 3, independent claim 17 has been amended to clarify the planar nature of the heat pipe heat spreader and the tubular nature of the evaporation portion of the loop thermosyphon that is engaged with the planar heat pipe heat spreader. Neither of these structures are expressly or inherently disclosed by the Anderson reference. More particularly, Anderson discloses an orientation independent evaporator having a wicking member which also operates as a manifold with a number of surface accessible channels or grooves cut in either side of a slab of wicking material. As a result of the inclusion of the wicking material, Anderson alleges that the evaporator operates effectively in any orientation with respect to a gravitational field. Anderson suggests the use of such an evaporator with thermosyphons, but at col. 3, lines 41 – 43, Anderson states:

"...The evaporator combines the gravity-independent characteristics of a heat pipe with a remote condenser and generally wickless nature of passive thermosyphons..."

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Anderson does not provide a planar heat pipe heat spreader that is thermally engaged with at least one heat generating component. Instead, Anderson provides an evaporator having a wick manifold 102 positioned within it. Anderson's wicking manifold 102 hardly provides a heat pipe. Moreover, nowhere after line 42 of column 3 is the word "heat pipe" mentioned within the Anderson reference. Furthermore, Applicant has amended claim 17 to make it clear that the evaporator of the loop thermosyphon that is thermally engaged with Applicant's planar heat pipe heat spreader, is a tube. As seen in Figs. 1 – 4 of the Anderson reference, Anderson simply does not disclose a tubular evaporator.

A planar heat pipe heat spreader and a tubular evaporator are not disclosed within the four corners of the Anderson reference, inherently or expressly. Applicant respectfully submits that claim 17 is patentable over the Anderson reference. Moreover, claims 18 – 20 are patentable at least through dependency from amended independent claim 17. Accordingly, reconsideration and withdrawal of the rejection of claims 17 – 20 under 35 U.S.C. §102(b) is requested.

With regard to Item 4, and referring to the discussion related to Item 2 above, Applicant respectfully submits that Grunes utterly fails to disclose a planar heat pipe heat spreader of any kind, and in fact, teaches away from the use of such a device. Thus, the Examiner's reliance upon the Otani reference in combination with Grunes likewise fails to render the instant invention obvious. Otani appears to provide a heat pipe having three sets of outgoing and incoming

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sections of heat where one section provides the function of a thermosyphon that is connected directly to the evaporating section of a second thermosyphon. The Examiner has not pointed to any portion of the Otani reference that provides a planar heat pipe heat spreader that is sized and shaped so as to spread thermal energy over an area larger than the area of at least one heat generating component. Thus, the combination of Grunes and Otani, when viewed as a whole, fails to teach or suggest the invention defined by independent claim 1 or dependent claims 3 – 4. Moreover, Grunes clearly teaches away from the use of a heat spreader that employs only a vapor-to-liquid heat transfer mechanism, i.e., Applicant's heat pipe, for heat transfer.

Accordingly, claims 3 and 4 are patentable over the proposed combination of Grunes and Otani.

With regard to Item 5, in order for a *prima facie* case of obviousness to be established, there must be some suggestion or motivation, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all of the claim limitations (MPEP §2142) [emphasis added]. Claims 5, 6 and 24 are patentable over the Grunes reference inasmuch as claims 5 and 6 are dependent from independent claim 1 which has been shown to be patentable over Grunes since Grunes teaches away from the use of heat pipes. Moreover, contrary to the Examiner's assertion, Figs. 2 and 3 of the Grunes reference do not present heat pipes of any kind.

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Claim 24 presents a method of managing thermal energy in which a two phase liquid is vaporized within a chamber by thermal energy by one or more devices and is spread over a surface that is relatively larger than the devices. Once again, Grunes teaches away from the use of heat pipes and does not disclose such devices in any of the figures relied upon by the Examiner.

Accordingly, claims 5, 6 and 24 are patentable over the Grunes reference.

With regard to Item 6, claim 21 presents a planar heat pipe heat spreader that is operatively engaged with an evaporation tube of a first loop thermosyphon. As discussed hereinabove, Anderson utterly fails to disclose a tubular evaporator, and in fact teaches a planar evaporator as shown in Figs. 1 – 4. Accordingly, claim 21 is patentable over the Anderson reference. The Examiner states that it would have been obvious to one skilled in the art to provide an evaporator portion of a second loop thermosyphon engaged with the second evaporator plate of Anderson to provide a plurality of outgoing sections of heat. However, Anderson does not disclose that such a second evaporator would be tubular. In fact, Anderson clearly suggests that his evaporators are planar (See Figs. 1-4 of Anderson).

In order for Anderson to render the subject matter presented by claim 21 obvious, there must be some motivation or suggestion within that reference or in the prior art as a whole at the time the invention was made to make such a change. Applicant respectfully submits that the Examiner has relied upon

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impermissible hindsight to modify Anderson so as to read upon the subject matter defined by claim 21. This is not allowed.

Accordingly, claim 21 as amended is allowable over the Anderson reference.

With regard to Item 7, claim 25 has been amended to present a method including the vaporizing of a two phase liquid within a chamber by thermal energy generated by one or more devices, and spreading that thermal energy over a surface that is relatively larger than the devices. This surface is thermally coupled to an evaporator tube of the loop thermosyphon. Neither Anderson nor Otani teach or suggest such a procedure.

Otani discloses a system comprising a condensing portion of a first loop thermosyphon being thermally engaged with an evaporating portion of a second thermosyphon, Otani does not recognize the benefits of utilizing a tubular evaporator engaged with a surface of a heat spreader in order to facilitate the heat transfer. Anderson utterly fails to disclose a tubular evaporator, and in fact teaches a planar evaporator as shown in Figs. 1 – 4. Taken together, as a whole, neither Otani nor Anderson teach or suggest spreading thermal energy over a surface that is relatively larger than a heat generating devices or thermally coupling an evaporator tube of a loop thermosyphon to that surface. Claim 25 is allowable over the proposed combination of Anderson and Otani.

Reconsideration and withdrawal of the rejection under 35 U.S.C. §103, are requested.

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With regard to Item 8, claims 10, 11, 13 and 14 are all patentable over the proposed combination of Grunes with U.S. Patent No. 5,822,187, issued to Garner. Reconsideration is requested for the following reasons. Applicant respectfully submits that Grunes utterly fails to teach or suggest a planar heat pipe heat spreader of any kind that relies only upon a vapor-to-liquid heat transfer mechanism (such as Applicant's planar heat pipe heat spreader). In fact, teaches away from the use of such a device. Grunes clearly suggests that the use of a heat pipe heat spreader is inferior and outside the scope of his disclosure.

Garner discloses a device for transferring heat across the hinged joint between the two sections of the case of a laptop computer. Garner teaches the use of simple heat pipe cylinders that are inserted into parallel cylindrical holes in a heat conductive block. The Examiner is reminded that there must be some suggestion or motivation, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings, and the prior art reference must teach or suggest all of the claim limitations. Garner makes no mention of loop-thermosyphons and Grunes teaches away from the very structure that Garner relies upon, i.e., a conventional heat pipe! Taken as a whole, the combination of Grunes and Garner fails to even vaguely suggest the unique structure defined by dependent claims 10, 11, 13 and 14. Each of claims 10, 11, 13 and 14 are dependent, directly or indirectly, from allowable claim 1, and are therefore allowable at least through dependency.

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Reconsideration and withdrawal of the rejection under 35 U.S.C. §103, are requested.

With regard to Item 9, the Examiner has had to combine the teachings of Grunes, Garner, and Otani in order to reject claim 15. As has been shown hereinabove, Grunes teaches away from the use of a planar heat pipe heat spreader of any kind that relies only upon a vapor-to-liquid heat transfer mechanism (such as Applicant's planar heat pipe heat spreader). Garner fails to discuss loop-thermosyphons or planar heat pipe heat spreaders, and Otani does not recognize the benefits of utilizing a tubular evaporator engaged with a surface of a heat spreader in order to facilitate the heat transfer.

Since nothing in these prior art references would lead a person of ordinary skill in the art to design an apparatus like that described in the application, or defined by claim 15, it appears that hindsight knowledge of the present invention is the only motivation to combine these references. Applicant respectfully submits that the motivation to combine references cannot come from the invention itself. See, In re Oetiker, 24 U.S.P.Q. 2d 1443, 1446. It is improper to use the claims as a framework with individual parts of separate prior art references employed to recreate a facsimile of the claimed invention. See, W.L. Gore and Associates, Inc. v. Garlock, Inc. 220 U.S.P.Q. 303, 312.

The Examiner is also referred to In re Bond, 910 F. 2d 831, 15 U.S.P.Q. 2d 1566 (Fed. Cir. 1990) which held that the PTO erred in rejecting a claimed invention as an obvious combination of the teachings of two prior art references

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when the prior art provided no teaching, suggestion, or incentive supporting the combination. See also, Northern Telecom, Inc. v. Datapoint Corp., 15 U.S.P.Q. 2d 1321, 1323; In re Geiger, 2 U.S.P.Q. 2d 1276, 1278. The Examiner is further referred to Smithkline Diagnostics, Inc. v. Helena Laboratories Corp., 859 F. 2d 878, 887, 8 U.S.P.Q. 2d 1468, 1475 (Fed. Cir. 1988) which held that one "cannot pick and choose among the individual elements of assorted prior art references to recreate the claimed invention."

In summary, Applicants submit that the unique apparatus defined by claims 1, 3-4, 6, 9-15, 17-21, 24-25 and 26 is not disclosed in the prior art references, taken as a whole, and there is no teaching or suggestion in the references to support their use in the particular claimed combination. In the absence of such, the references are improperly combined. In any event, claims 1, 3-4, 6, 9-15, 17-21, 24-25 and 26 define over the various proposed combinations of Grunes, Otani, Anderson, and Garner.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

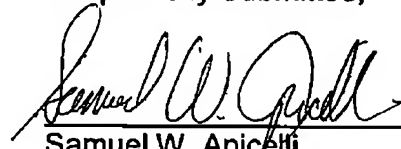
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If a telephone conference would be of assistance in advancing
prosecution of the above-identified application, Applicant's undersigned Attorney
invites the Examiner to telephone him at 717-237-5516.

Date:

July 6, 2004

Respectfully Submitted,



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HBGV127830.1